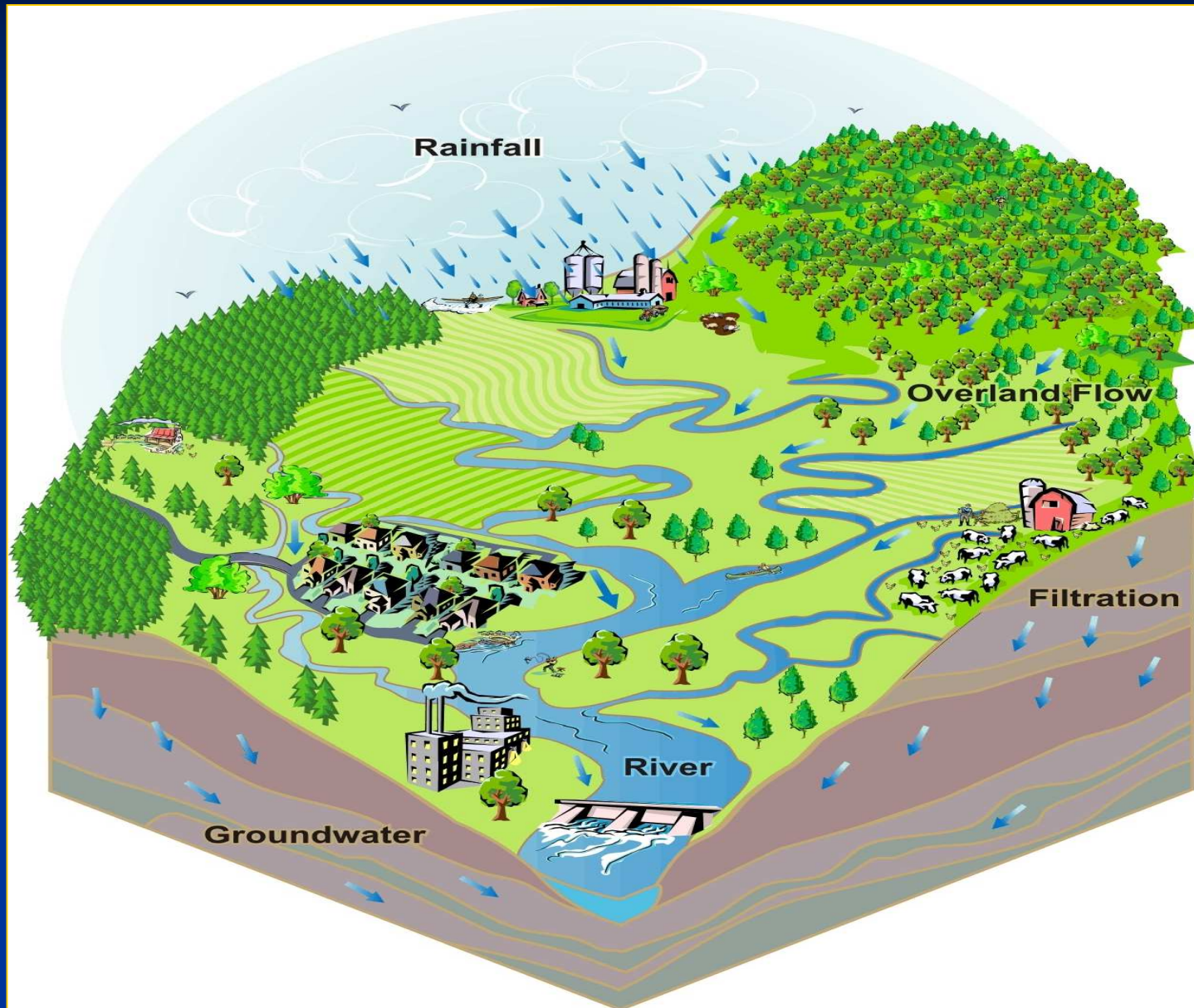


# A WATERSHED VIEW



# UNDERSTANDING WATERSHEDS

- 💧 1<sup>st</sup> Law of hydrology: “Water runs downhill”
- 💧 Understand how watersheds are defined
- 💧 Impacted by natural phenomena and human activities
- 💧 Importance of a watershed view
- 💧 Mapping your watershed

# UNDERSTANDING WATERSHEDS

- Essential to the interpretation of stream health and water quality
- Everything that occurs within a watershed affects water resources
- Stream health depends on a healthy watershed.

# WATERSHED MAPPING BENEFITS

- 💧 Identify potential sources of pollution
- 💧 Identify monitoring sites
- 💧 Provide information to educate
- 💧 Provide a sense of value
- 💧 To make informed decisions



# WHAT IS A WATERSHED?

- A topographically-defined area of land that drains into a particular body of water
  - Drainage basin
  - Catchment area

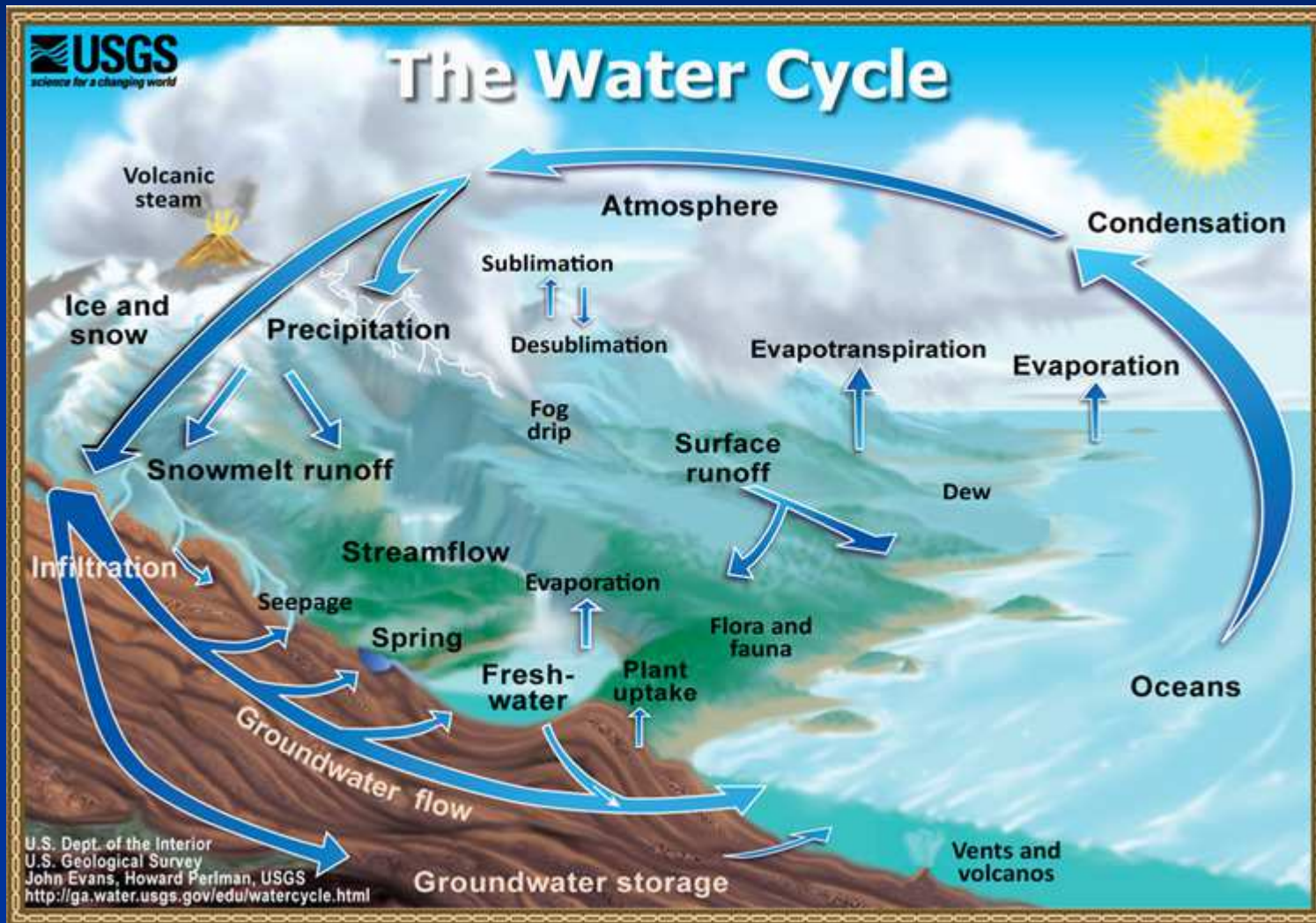




**Initiation**



# HYDROLOGY



# VARIABLES CONTROLLING WATERSHED CHARACTERISTICS

- Climate
- Hydrology
- Geology
- Soil types
- Slope/gradient/topography
- Land use/land cover



# CLIMATE AFFECTS...

- Erosion and deposition and how they form the landscape
- Types of soil and vegetation present
- Climactic conditions influence the movement of water and sediment

# WATERSHED GEOLOGY

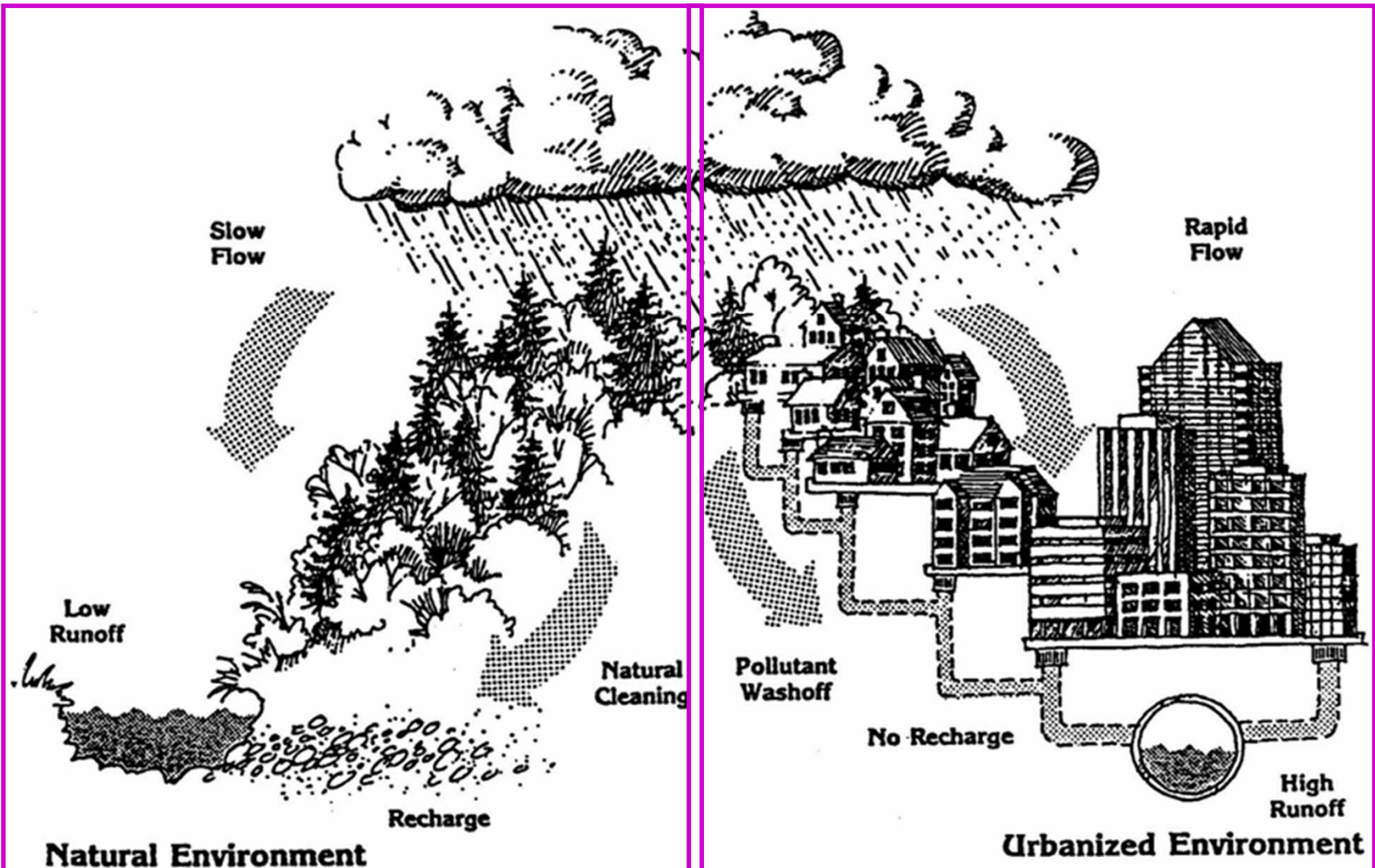
The rocks and sediments that underlie the watershed determine:

- Groundwater storage
- Materials present to form soil types
- Material available for erosion and transport
- Chemical quality of water

# LAND USE/LAND COVER

- Disturbed areas without vegetation suffer from increased runoff and erosion
- Impervious surfaces
- Undisturbed areas, wetlands, uncompacted soils, and vegetation absorb water and slow runoff

# HUMAN USES OF LAND AND WATER IMPACT WATER QUALITY



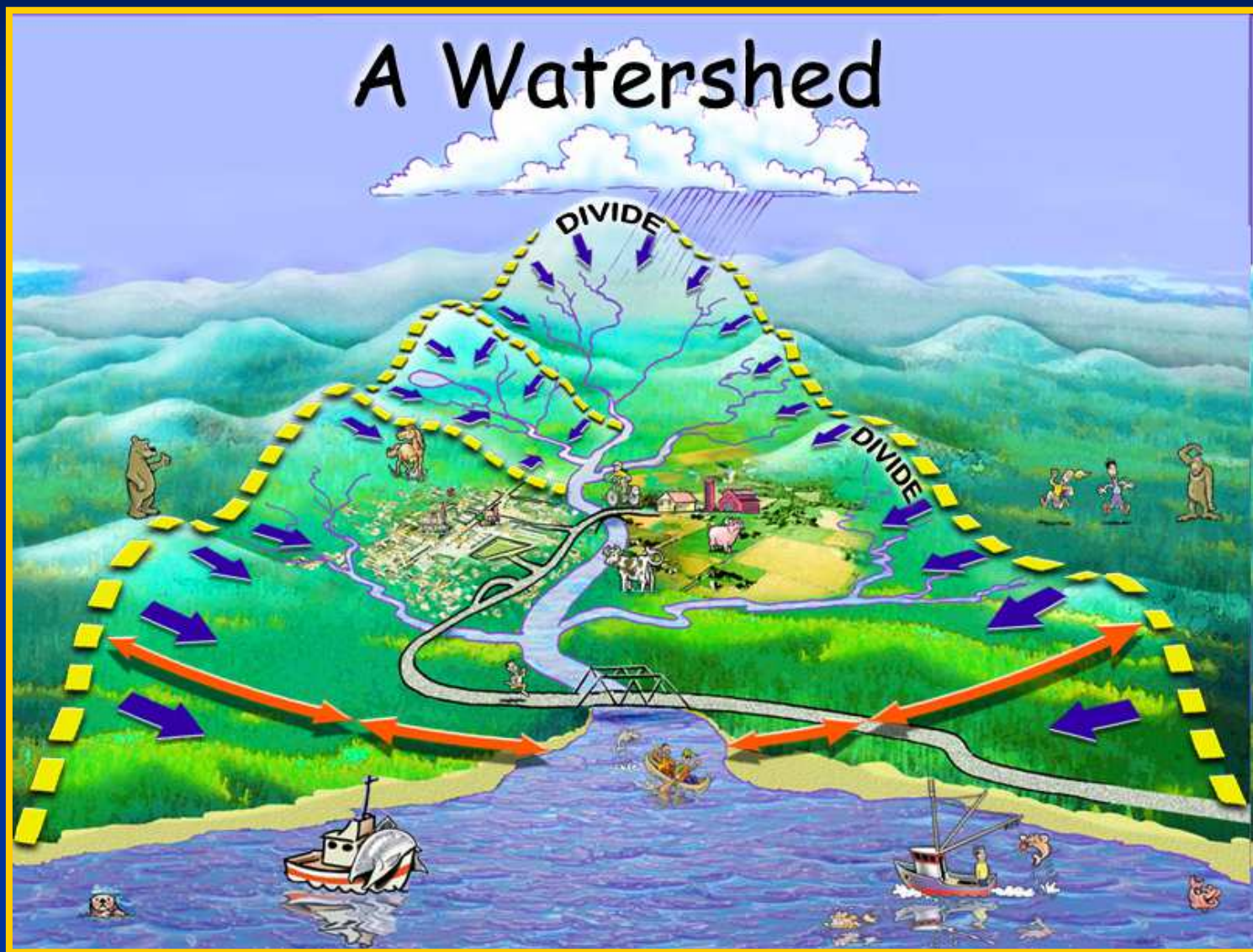
drawing courtesy City of Bellevue Utilities Department

# WATERSHED DYNAMICS

- 💧 All parts of a watershed are interconnected
- 💧 Most pervasive threat to water quality is siltation due to runoff and soil erosion
- 💧 Land use, slope, and soil type influence runoff and erosion
- 💧 Activities in upper reaches of watershed affect water quality down stream



# WATERSHEDS ARE INTERCONNECTED WATER SYSTEMS





## Parts of a watershed:

### Uplands

- infiltration and run-off
- slope
- sediment and nutrients
- filtration

### Floodplains

- water storage
- dissipate velocities
- sediment drop
- channel adjustment zone

### Riparian Corridor

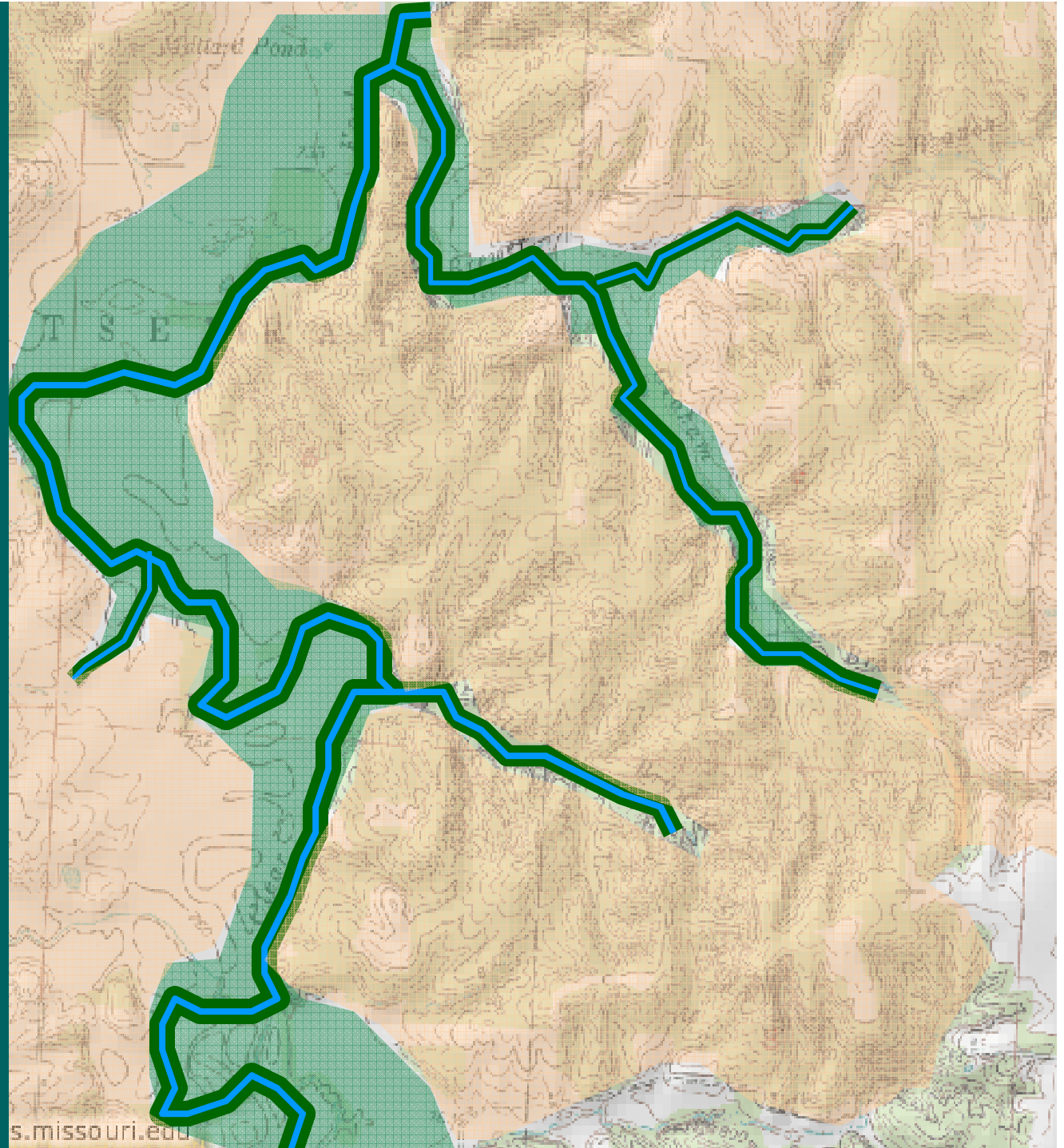
- regulate temperatures
- reduce velocities
- stabilize banks
- organic input
- filter / traps debris
- habitat structure

### Stream Channel

- water and sediment transport

### Groundwater

- provides base flow



# MISSISSIPPI RIVER WATERSHED

Drainage area  
of 1.2 million  
square miles

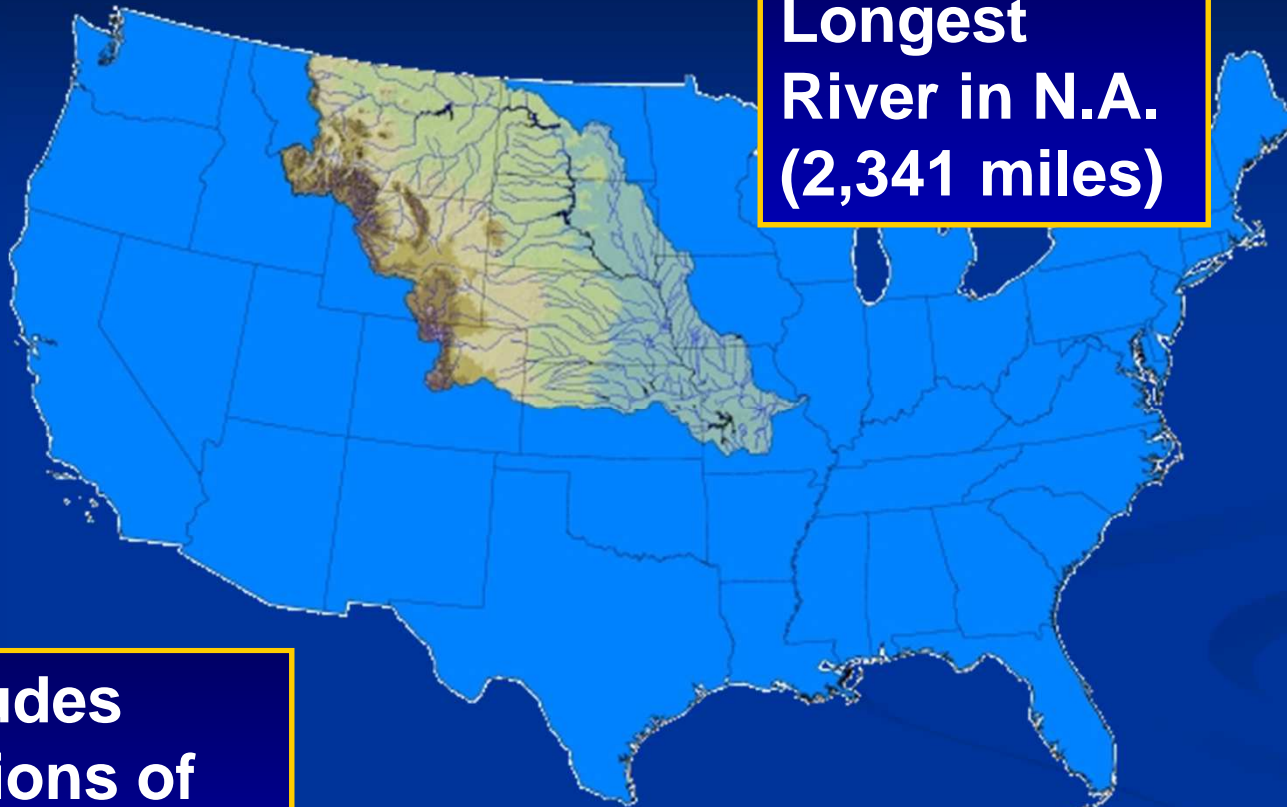
3rd largest  
watershed in  
the world

Includes  
portions of 30  
states and a  
small part of  
Canada





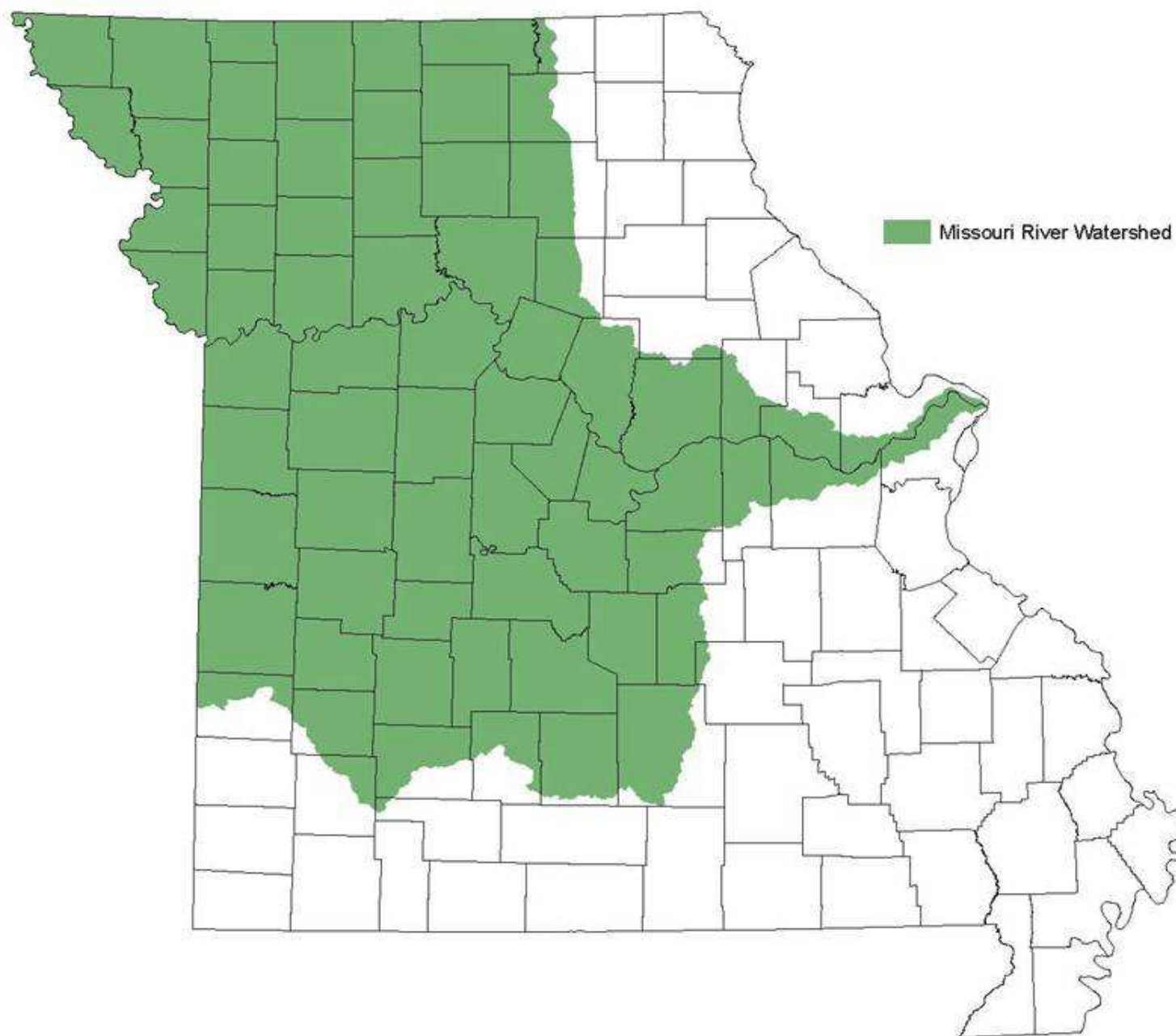
# MISSOURI RIVER WATERSHED

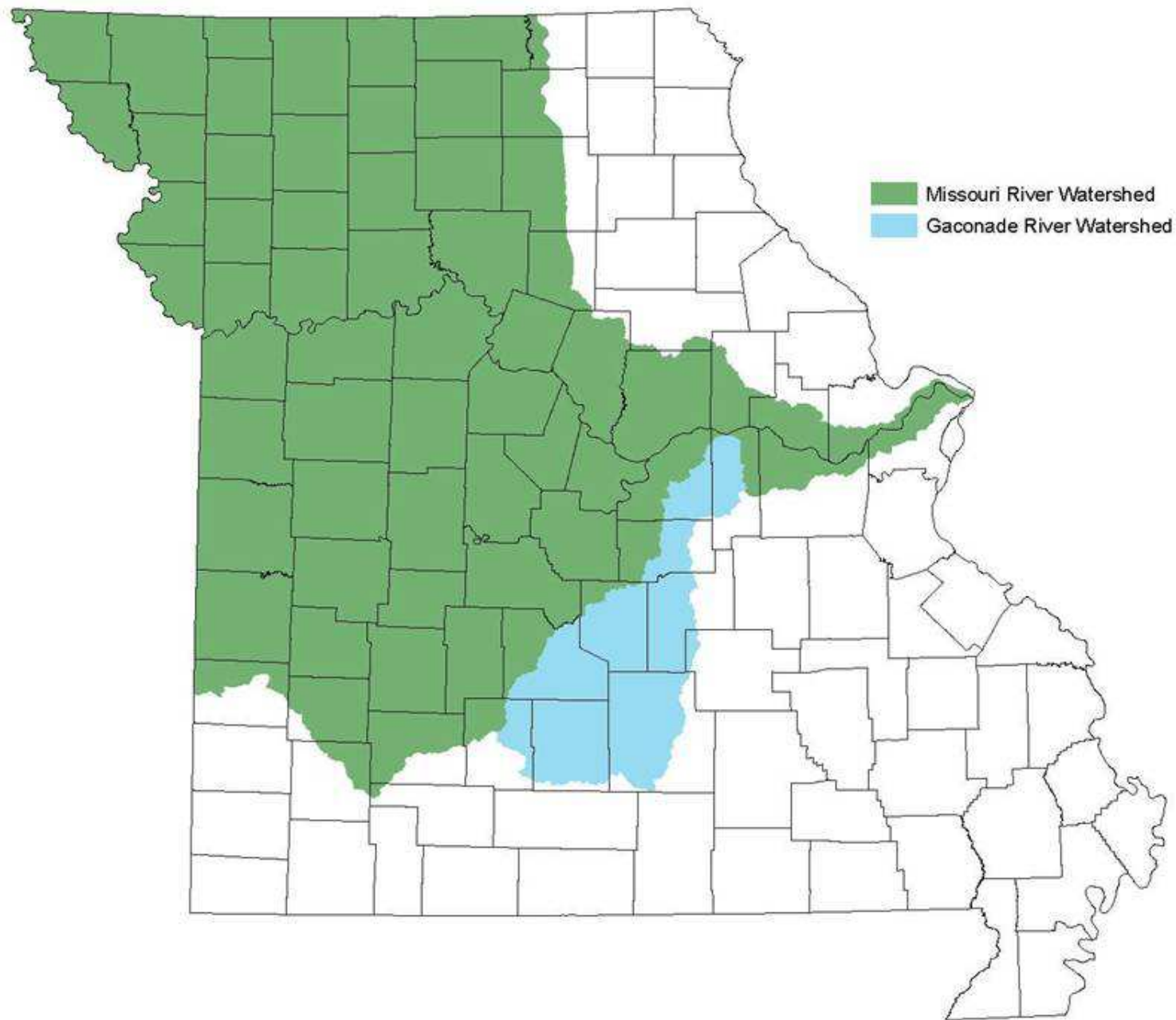


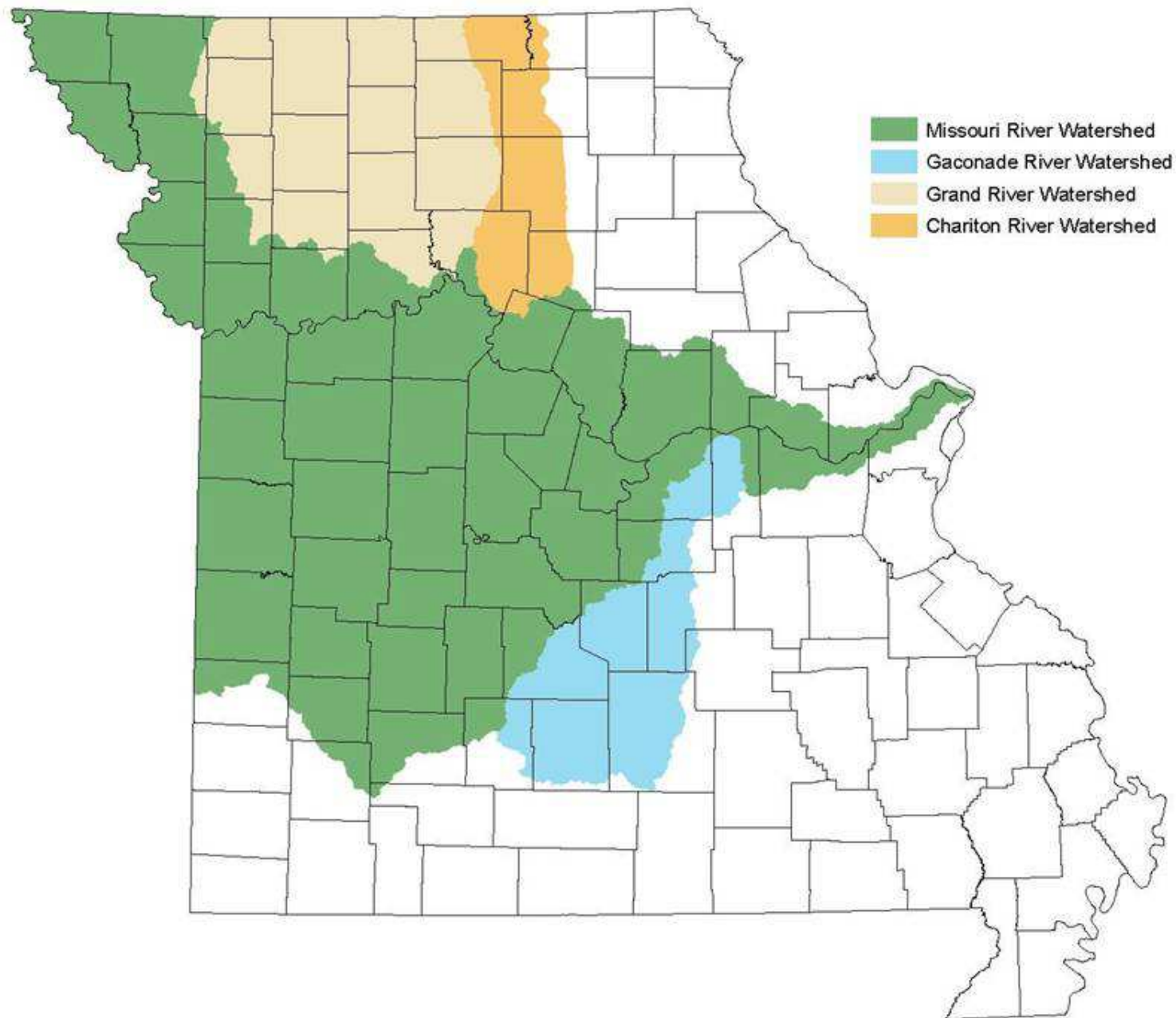
**Longest  
River in N.A.  
(2,341 miles)**

**Includes  
portions of  
10 states and  
a small part  
of Canada**

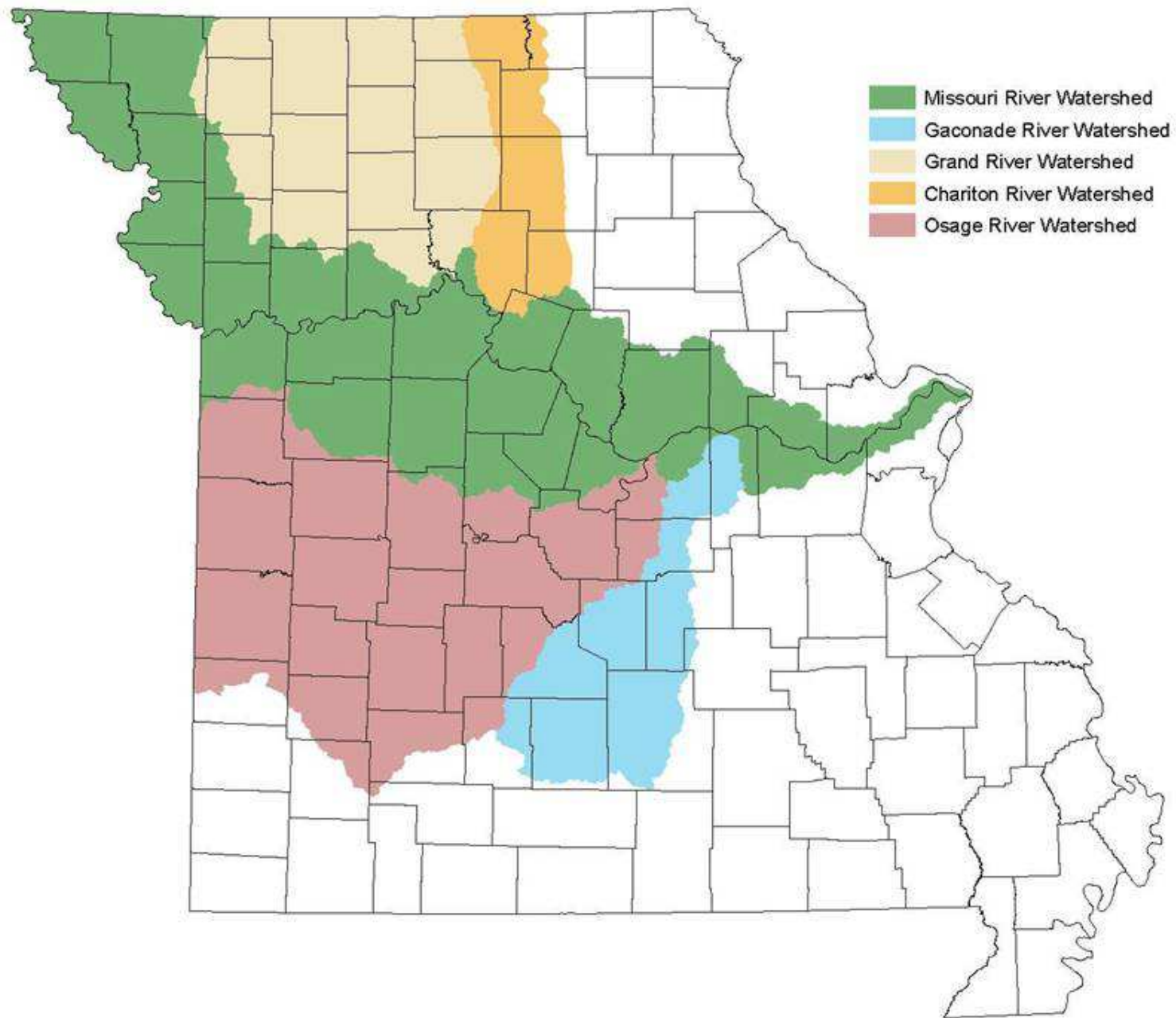
**Drainage area  
of 529,350  
square miles  
(1/6 of U.S.)**

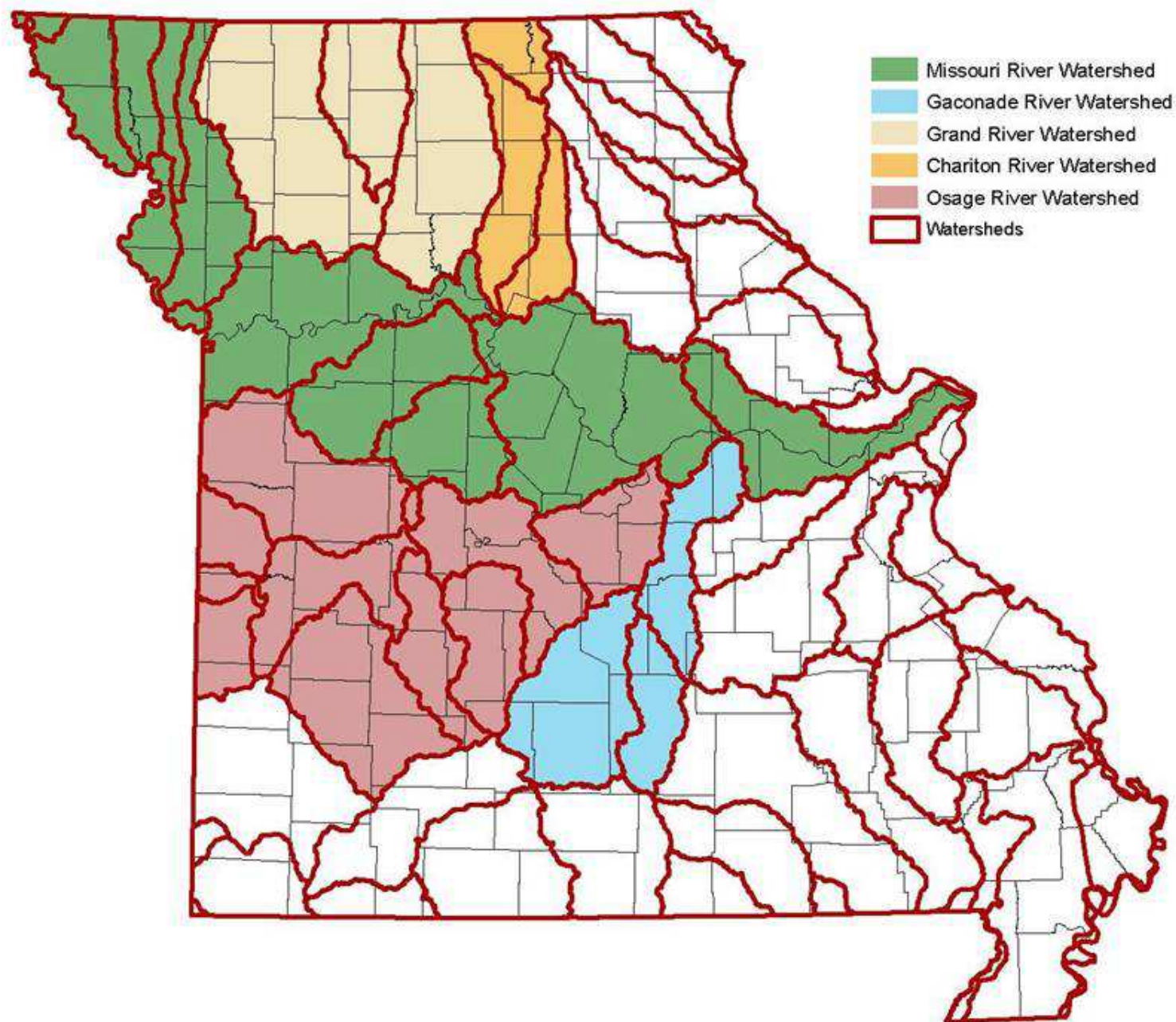




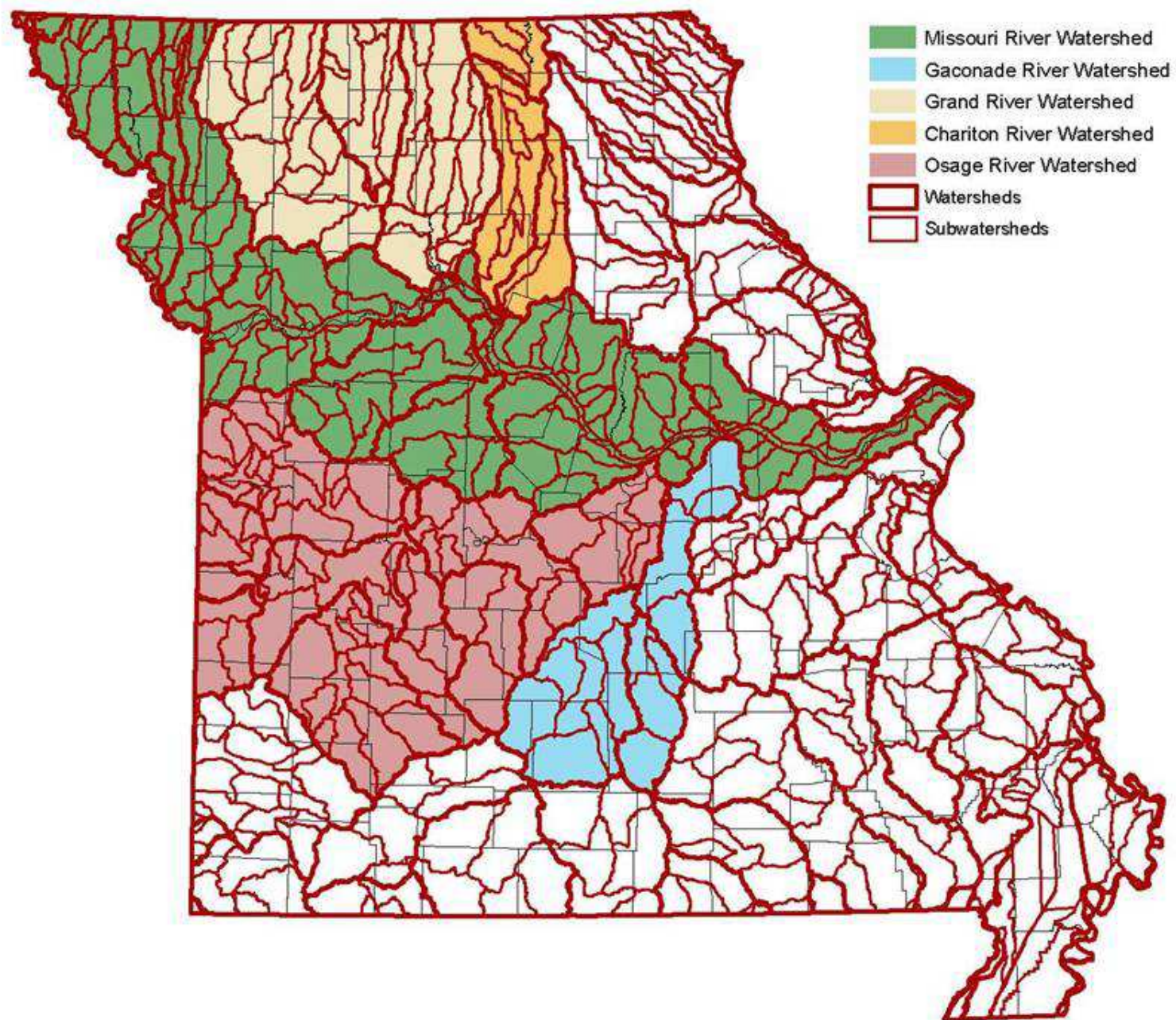




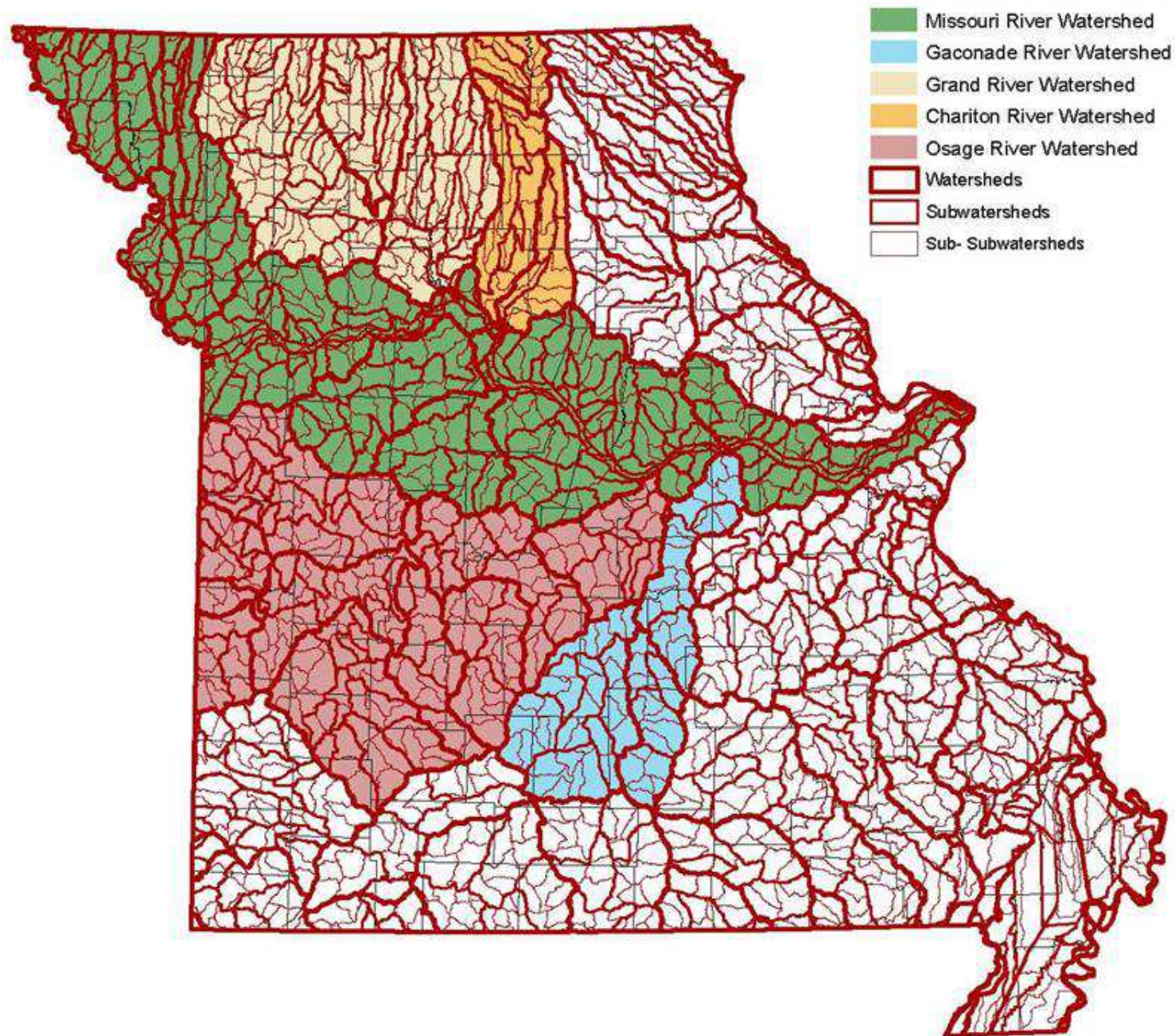






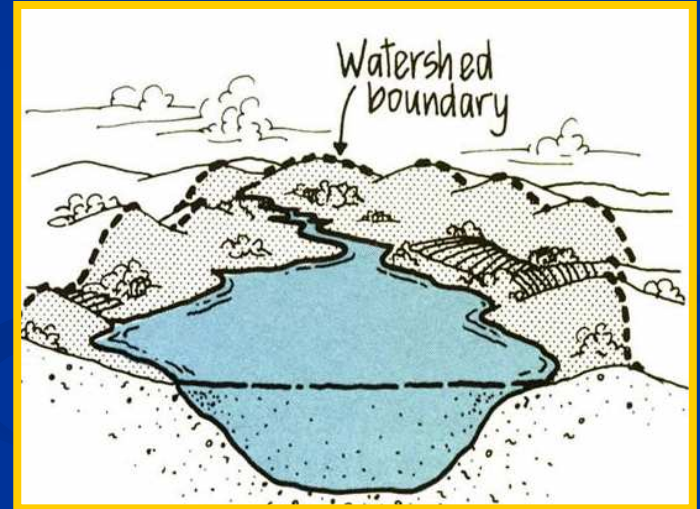






# YOUR WATERSHED

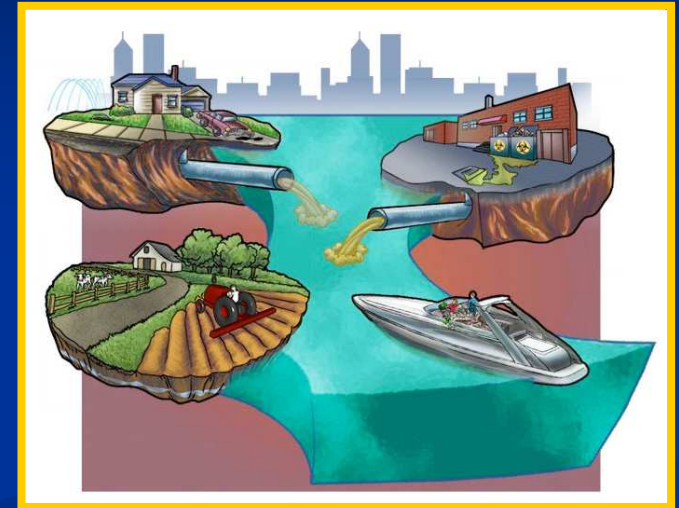
- Choose a manageable size
- Know your watershed boundaries as defined by topography
- Land use



# TYPES OF POLLUTANTS

## Point source pollution

- Such as a pipe discharge
- Requires a permit



## Nonpoint source pollution

- From a number of diffuse sources
- Harder to identify so more difficult to control



# NONPOINT SOURCE POLLUTION

## Agricultural Sources

- 💧 soil erosion
- 💧 animal waste
- 💧 fertilizer
- 💧 pesticides



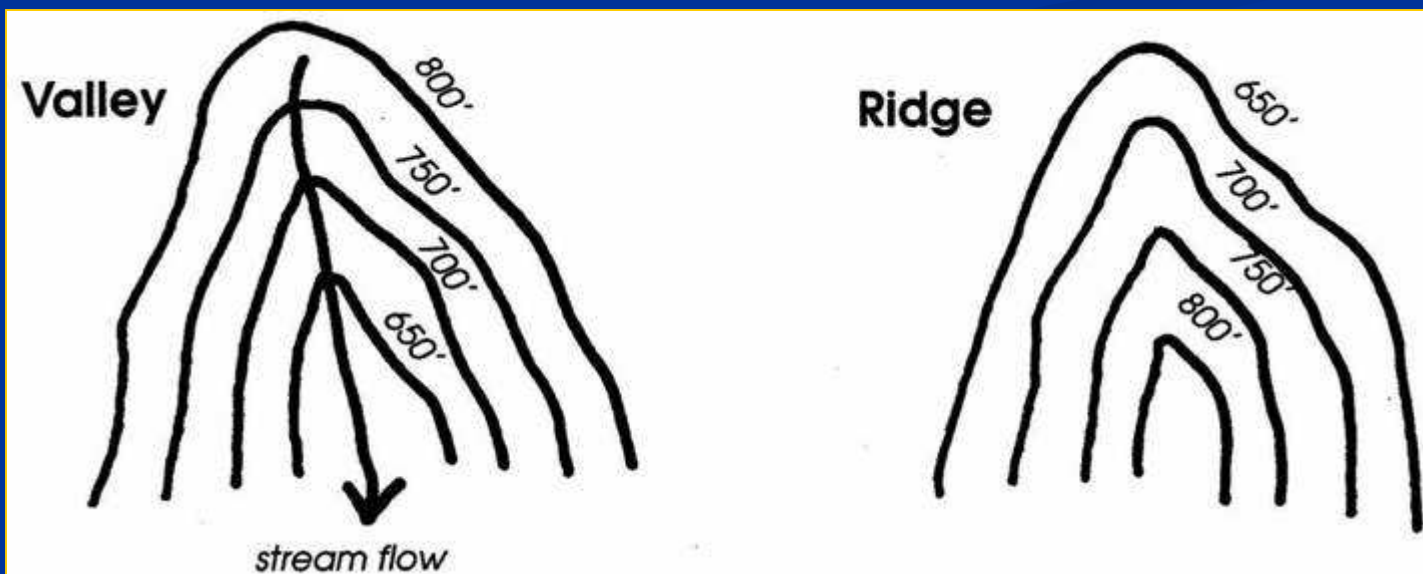
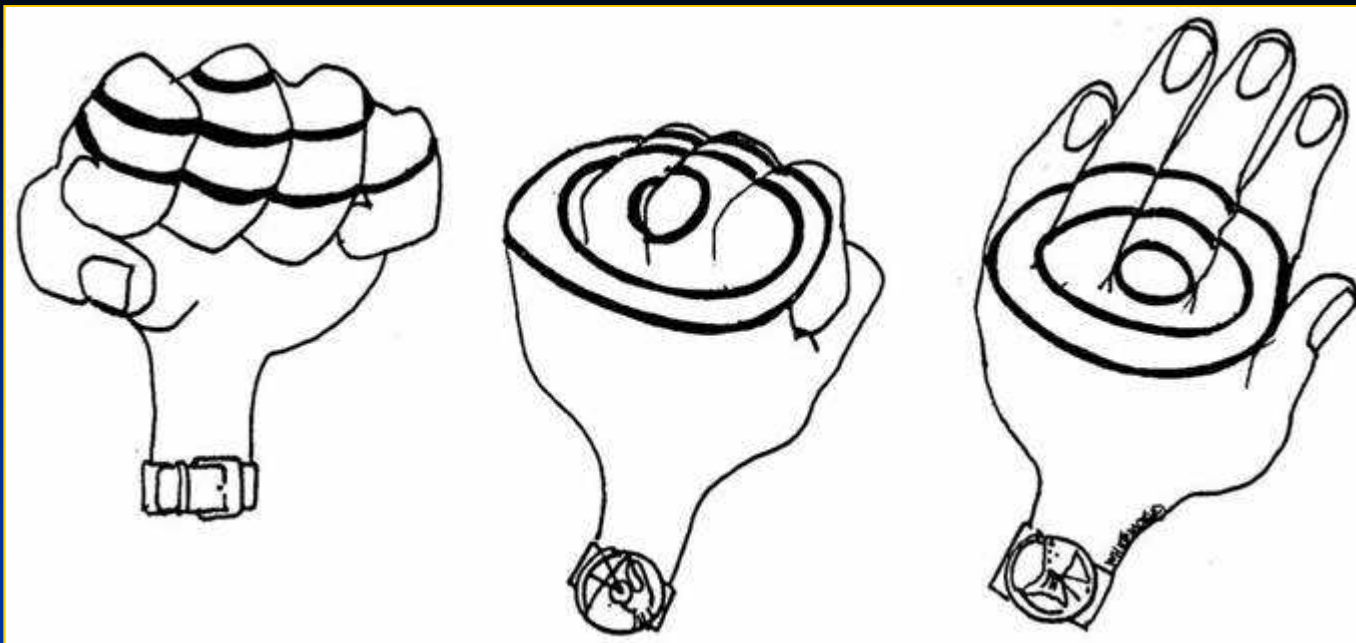
# NONPOINT SOURCE POLLUTION

## Urban Sources

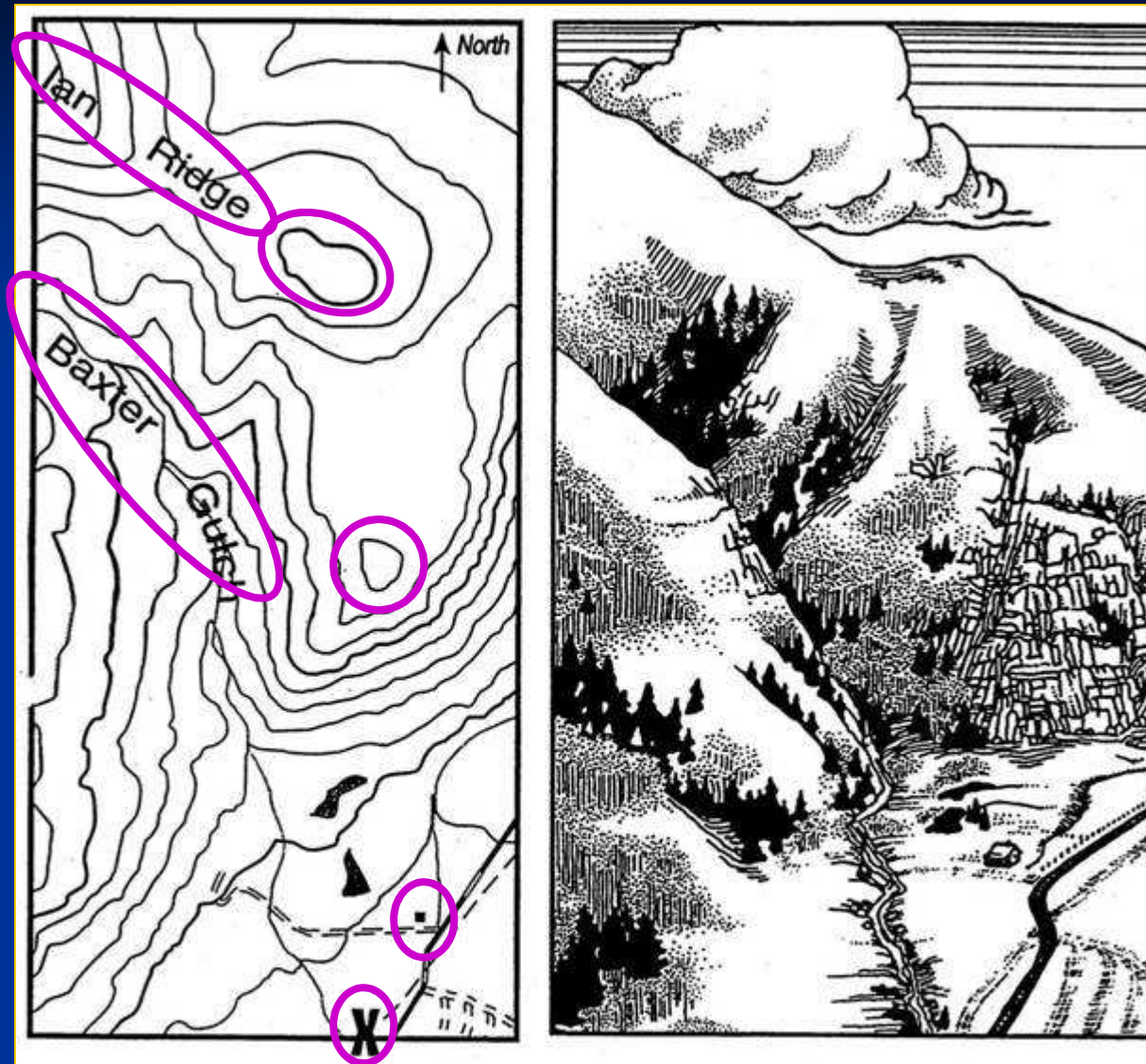
- runoff from impervious surfaces
- fertilizers & pesticides from lawns, parks, golf courses
- sediment from construction sites
- cleaning products
- pet waste

# TOPOGRAPHIC MAPS

- Represent a four-sided region called a quadrangle
- Use *contour lines* to illustrate relief
- *Symbols* show boundaries, surface features, buildings, roads, railroads, and communication features
- *Scale* represents distance



# TRANSLATING THE TOPO MAP TO REAL LIFE



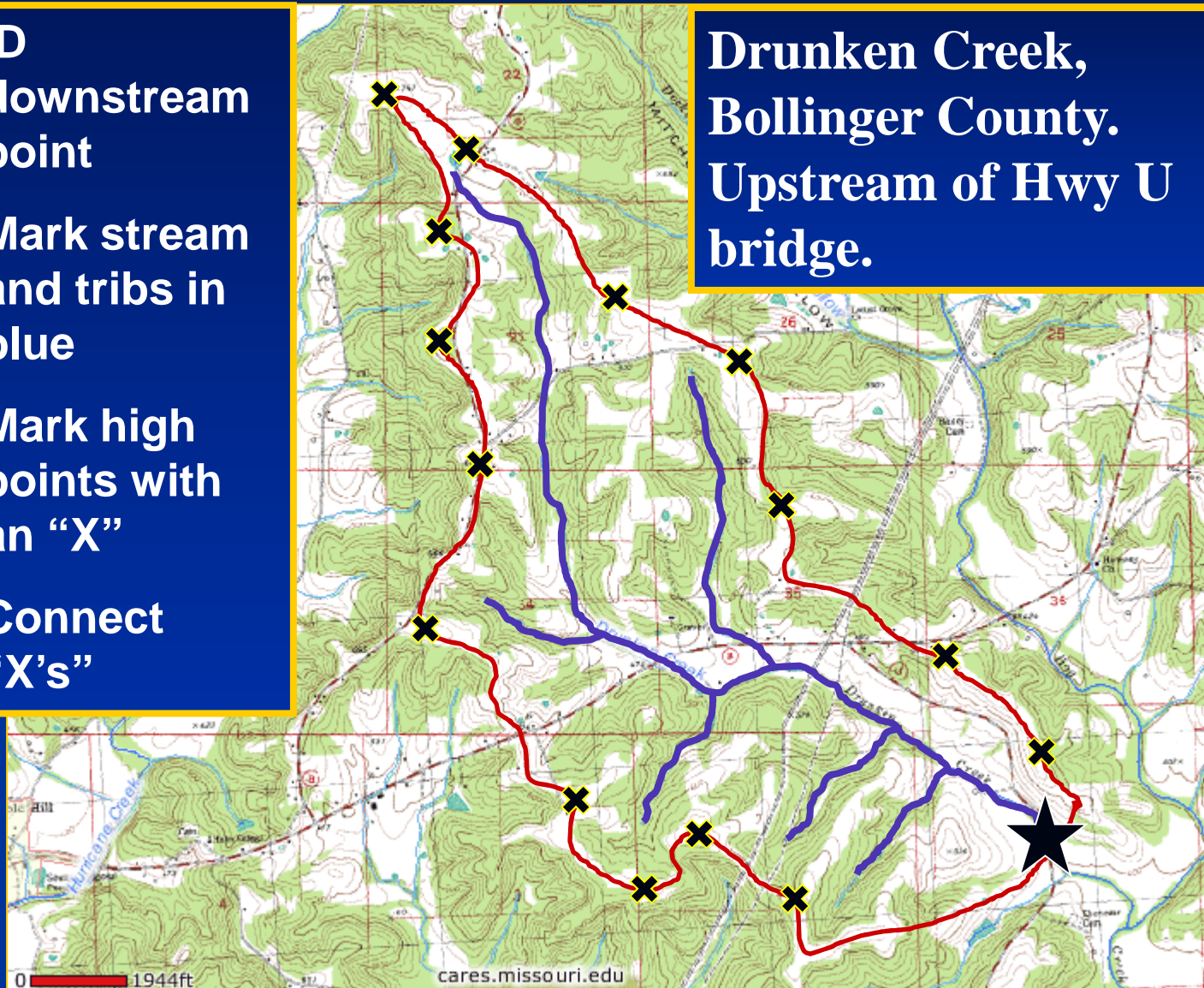
Standing at the "X" on the topo map (above left), someone looking north would see the scene depicted above, right, including the secondary highway, streams, house, unfinished roads, ponds, and mountain ridges.



# Drunken Creek Watershed

- 1) ID downstream point
- 2) Mark stream and tribs in blue
- 3) Mark high points with an "X"
- 4) Connect "X's"

Drunken Creek,  
Bollinger County.  
Upstream of Hwy U  
bridge.





# Online Watershed Mapping

- CARES Map Room
  - <http://cares.missouri.edu>
  - Click Map Room
- Three options for mapping your watershed:
  - Missouri Interactive Maps
  - Missouri Watershed Tool
  - Atlas Maps



# Watershed Evaluation and Comparison Tool

Center for Applied Research and Environmental Systems

www.cares.missouri.edu

Home

*Envisioning Tomorrow... Today*

**COMMUNITY COMMONS**  
CARES is the primary technology provider for this interactive mapping, networking, and learning utility for the broad-based healthy/sustainable/livable communities' movement.

**MAP ROOM**  
Create customized interactive maps from a wide range of economic, demographic, physical and cultural data. Access a suite of analysis tools and maps for specialized topics.

**PROJECTS**  
Access information developed through ongoing research between staff at CARES and outside organizations.

**What's New**  
**November 11, 2013** -CARES welcomes Jeanie Phipps, our new Administrative Associate.  
**May 2013** -Great news from Esri! CARES won the Special Achievement in GIS (SAG) Award for 2013!  
**April 6, 2013** -Chris Fulcher made a TedX presentation here in Columbia, MO. <http://tedxcomom.org>  
**March, 2013** -Chris Fulcher and Erin Barbaro present at The Robert Wood Johnson Foundation's Healthy Eating Research 7th Annual Grantee meeting in New Orleans.  
[more news & events](#)

**Mizzou**  
University of Missouri

130 Mumford Hall, Columbia, MO 65211  
Tel: 573.882.7458 | Fax: 573.884.2199  
Division of Applied Social Sciences  
College of Agriculture, Food and Natural Resources  
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Watershed Evaluation and Comparison Tool

Home

**Introduction**

**Welcome to the Watershed Evaluation and Comparison Tool**

The Watershed Evaluation and Comparison Tool facilitates watershed-based data visualization and assessment. The tool generates reports for a number of factors related to watershed condition, presenting the information in tables, charts, and interactive maps.

A basic watershed profile can be generated for a single watershed, or for multiple watersheds for comparison purposes. An indicator report (for nutrient management) provides a special topic-based report. Watershed reference maps are also available with each report, or separately under the printable maps section.

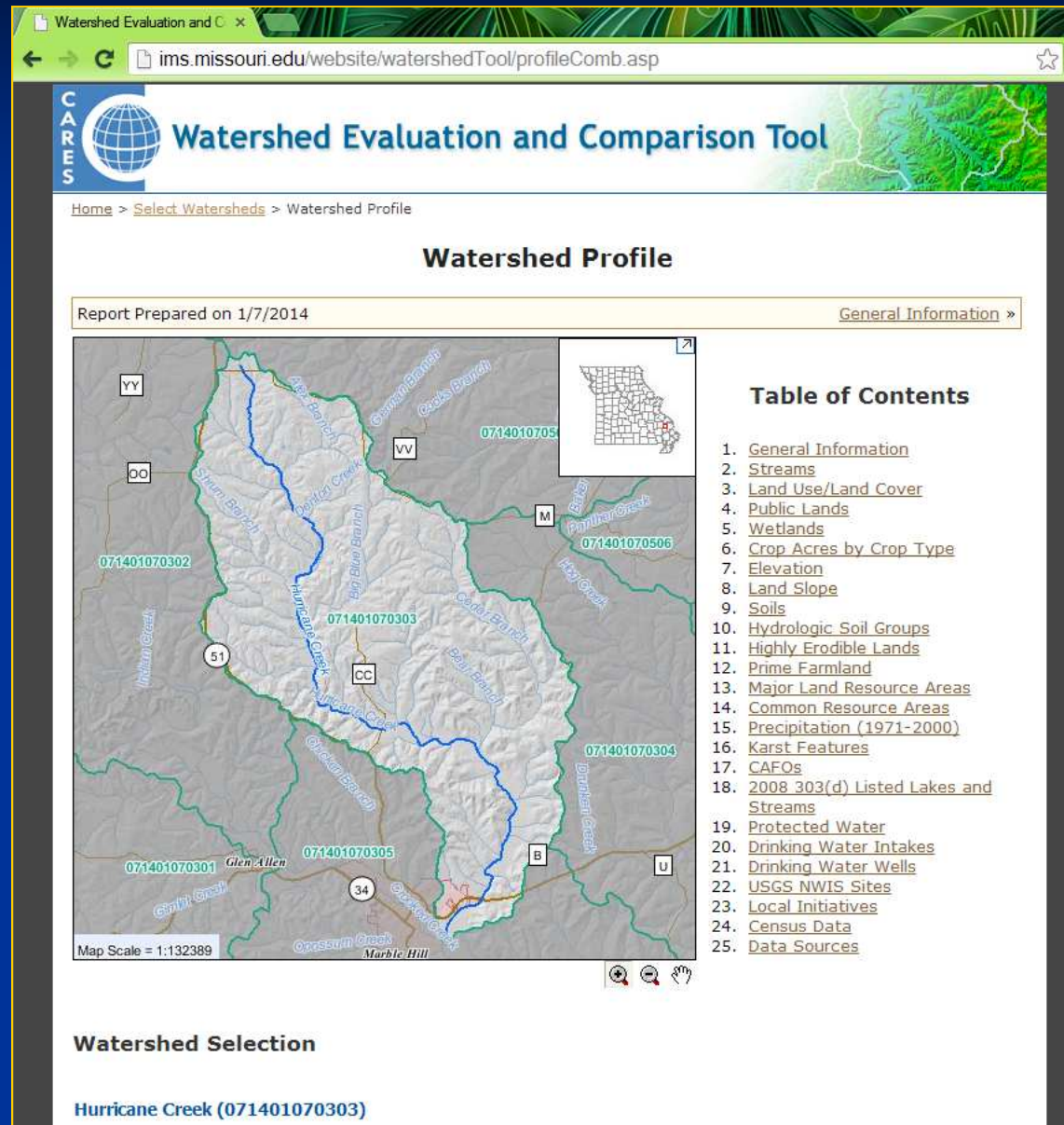
This project was funded in part by the Missouri Department of Natural Resources.

Click the Start button below to begin.

**Start**

This project was partially funded by the US EPA, Region 7, through the [Missouri Department of Natural Resources](#) (subgrant #G06-NPS-11), under Section 319 of the Clean Water Act.

# Watershed Evaluation and



# STREAM TEAM INVENTORY GUIDE

INVENTORY YOUR ADOPTED STREAM AND . . .

LEARN ABOUT YOUR STREAM'S HEALTH

IDENTIFY PROBLEMS THAT MAY NEED WORK

UNDERSTAND MORE ABOUT STREAMS IN GENERAL



♦ EDUCATION ♦ STEWARDSHIP ♦ ADVOCACY ♦